π IN THE SKY[7]

Answer Key

Planet Pinpointer

Given the angle of the disk's apparent size is 169 arcseconds, determine the actual distance across it using the formula for small angle approximation.

1. **Convert arcseconds to degrees.**

   $1 \text{ arcsec} = (1/3{,}600)^\circ$

   $169 \text{ arcsec} \bullet 1^\circ/3{,}600 \text{ arcsec} \approx 0.0469^\circ$

2. **Multiply degrees by π/180° to convert degrees to radians.**

   $0.0469^\circ \bullet (\pi \ / \ 180^\circ) \approx 0.000819 \text{ radians}$

3. **Use the formula for small angle approximation to find the distance across the Beta Pictoris debris disk.**

   $D = d\theta$

   $D = (6 \bullet 10^{14} \text{ km}) \bullet 0.000819 \approx$ 500 billion km